AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF PAGES
N/A	1	37

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
0020	3 JUL 03	N/A	SPEC. NO. 1296

6. ISSUED BY CODE

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS SACRAMENTO
1325 J STREET
SACRAMENTO, CALIFORNIA

7. ADMINISTERED BY *(If other than Item 6)* CODE

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP Code)*

CODE FACILITY CODE

(√) X

9A. AMENDMENT OF SOLICITATION NO.
DACW05-03-B-0007

9B. DATED *(SEE ITEM 11)*
21 APR 2003

10A. MODIFICATION OF CONTRACTS/ORDER NO.
N/A

10B. DATED *(SEE ITEM 13)*
N/A

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(√) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation date, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

D. OTHER *(Specify type of modification and authority)*

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return _____copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

SACRAMENTO RIVER FLOOD CONTROL SYSTEM PHASE 11 - MARYSVILLE/YUBA AREA SITE 7 EXTENSION
YUBA COUNTY, CALIFORNIA ***NOTE: AS CLARIFICATION, THE BID OPENING TIME IS 10:00 A.M. ON 8 JULY 2003.***

1 ENCL 1) PRICING SCHEDULE FOR CLARIFICATION PURPOSES ONLY AND REVISED SECITON 16010.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
15B. CONTRACTOR/OFFEROR *(Signature of person authorized to sign)*	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY *(Signature of Contracting Officer)*	16C. DATE SIGNED

PRICING SCHEDULE

CONTRACTOR SHALL FURNISH ALL PLANT, LABOR, MATERIAL, EQUIPMENT, ETC. NECESSARY TO PERFORM ALL WORK IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS SET FORTH IN THE CONTRACT TO INCLUDE ALL ATTACHMENTS THERETO.

SITE 7 EXTENSION

LINE ITEM NO.	DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT PRICE	TOTAL PRICE
0001	PREPARATORY WORK AND SITE CLEANUP	1	LUMP SUM	LUMP SUM	$_____
0002	CLEARING AND GRUBBING	1	LUMP SUM	LUMP SUM	$_____
0003	EMBANKMENT FILL	157,100*	CY	$_____	$_____
0004	GEOTEXTILE	131,500*	SY	$_____	$_____
0005	DRAIN ROCK	43,620*	TON	$_____	$_____
0006	EXCAVATION	4,000*	CY	$_____	$_____
0007	CONCRETE				
0007AA	DITCH LINER (4")	***3,700****	***LF***	$_____	$_____
0007AB	HEADWALL	2*	CY	$_____	$_____
0008	FLAP GATE				
0008AA	FLAP GATE 8"	1	EA	$_____	$_____
0008AB	FLAP GATE 24"	1	EA	$_____	$_____
0009	ROCK RIPRAP	14*	TON	$_____	$_____
0010	TRASH RACK	1	LUMP SUM	LUMP SUM	$_____
0011	STORM DRAIN MANHOLE	1	EA	$_____	$_____
0012	8" DIA. STEEL PIPE	600*	LF	$_____	$_____
0012AA	24" DIA. STEEL PIPE	125*	LF	$_____	$_____

0013	AGGGREGATE BASE ***(MAINTENACE & HAUL RD)***	***6,870****	***CY***	***$_____***	***$_____***
0014	BARBED FENCE	9,350*	LF	$_____	$_____
0015	PIPE GATE	***3***	EA	$_____	$_____
0016	RELIEF WALLS				
0016AA	INSTALL AND TESTED	19	EA	***$***_____	***$***_____
0016AB	PRECAST MANHOLE	19	EA	***$***_____	***$***_____
	SUBTOTAL ESTIMATED PRICE (ITEMS 0001 THRU 0016)				$_____
	PUMP STATION, PUMP, MOTOR AND ELECTRICAL WORK				
0017	MOBILIZATION/ DEMOBILIZATION	1	LUMP SUM	LUMP SUM	$_____
0018	VERTICAL AXIAL-FLOW OR MIXED FLOW SINGLE STAGE IMPELLER-TYPE PUMP	2	EA	$_____	$_____
0019	PUMP CONTROL CENTER AND ELECTRICAL PANEL (INCLUDES CONDUIT, ALARMS, SENSORS, TELEMETRY, BOLLARDS, PG & E SERVICE, AND OTHER INCIDENTAL ELECTRICAL WORK	2	EA	$_____	$_____
0020	PUMP AND MOTER INSTALLATION (INCLUDES ALL WORK TO INSTALL AND SETUP THE PUMP AND MOTER INSIDE THE PUMP STRUCTURE, INCLUDING ALL TESTING AND QUALITY CONTROL WORK	2	EA	$_____	$_____
0021	PG & E POLE RELOCATION, TRANSFER WORK AND METER PANEL (INCLUDES ALL COORDINATION WORK WITH PG & E, ALL FEES TO BE PAID BY OTHERS)	1	LUMP SUM	LUMP SUM	$_____
0022	CAST-IN-PLACE CONCRETE (MOTOR CONTROL PAD)	1	LUMP SUM	LUMP SUM	$_____
0023	CAST-IN-PLACE CONCRETE (TRANSFORMER PAD)	1	LUMP SUM	LUMP SUM	$_____
0024	SECURITY LIGHTING	1	EA	$_____	$_____
0025	PUMP STATION STRUCTURE (COMPLETE)	1	LUMP SUM	LUMP SUM	$_____

0026	PIP, VALVES, LIDS, ACCESS COVER, BOLLARDS, EXPANDED METAL GRATING, PAINT/COATINGS AND TRASH RACK (ITEMS NOT INCLUDED AS INDIVIDUAL PAY ITEMS)	1	***LUMP SUM***	LUMP SUM	$_____

SUBTOTAL ESTIMATED PRICE $_____
(ITEMS 0017 THRU 0026)

PIPE CROSSING AND LEVEE WORK

0027	MOBILZATION/ DEMOBILZATION	1	***LUMP SUM***	LUMP SUM	$_____
0028	CONSTRUCTION AREA SIGNS	1	***LUMP SUM***	LUMP SUM	$_____
0029	HAUL ROUTE PLAN AND TRAFFIC CONTROL	1	***LUMP SUM***	LUMP SUM	$_____
0030	CLEARING AND GRUBBING	4.5	ACRE	$_____	$_____
0031	DEMOLITION OF EXISTING PUMP STRUCTURE	1	***LUMP SUM***	LUMP SUM	$_____
0032	DEMOLITION OF EXISTING TRASH RACK	1	***LUMP SUM***	LUMP SUM	$_____
0033	DEMOLITION OF EXISTING OUTFALL STRUCTURE	1	***LUMP SUM***	LUMP SUM	$_____
0034	DEMOLITION OF EXISTING 72" CULVERT PIPES (PIPES SHALL BE REMOVALABLE AND WASTED	1	***LUMP SUM***	LUMP SUM	$_____
0035	DEMOLITION OF MISCELLANEOUS ITEMS (ITEMS NOT INCLUDED AS INDIVIDUAL PAY ITEMS	1	***LUMP SUM***	LUMP SUM	$_____
0036	LEVEE EXCAVATION	8,500*	CY	$_____	$_____
0037	COMPACTED LEVEE EXCAVATION	20,500*	CY	$_____	$_____
0038	CAANAL EXCAVATION	3,500*	CY	$_____	$_____
0039	COMPACTED CANAL EMBANKMENT	2,500*	CY	$_____	$_____
0040	CLASS 2 AGGREGATE BASE	1,700*	TON	$_____	$_____

0041	CORROW (INCLUDES COST OF SOIL AND DELIVERY TO SITE, IT DOES NOT INCLUDE COST TO PLACE SOIL. THE COST TO PLACE SOIL IS PART OF LEVEE EMBANKMENT)	18,000*	CY	$_____	$_____
0042	TRENCH SHEETING, SHORING, AND BRACING AS REQUIRED BY SECTION 6707 OF THE CALIFORNIA LABOR CODE)	1	***LUMP SUM***	LUMP SUM	$_____
0043	7' SPAN X 5' RISE REINFORCED CONCRETE BOX CULVERT	372*	LF	$_____	$_____

SUBTOTAL ESTIMATED PRICE $_____
(ITEMS 0027 THRU 0043)

PUMP STATION NO. 2

0044	36" HIGH DENSITY POLYETHYLENE DISCHARGE PIPE (SDR 17) OR 36" CORROSION-PROOFED STEEL DISCHARGE PIPE (7 GAUGE)	840*	LF	$_____	$_____
0045	SIPHON BREAKER AND AIR RELIEF VALVE	2	EA	$_____	$_____
0046	36" GATE VALVE AT LEVEE TOP (GATE VALVE SHALL BE SIDE OPERATED DUE TO LIMITED CLEARANCE)	2	EA	$_____	$_____
0047	CORROSION-PROOFED STEEL CUTOFF WALL	1	***LUMP SUM***	LUMP SUM	$_____
0048	CHAIN LINK FENCE TYPE CL-6	300*	LF	$_____	$_____
0049	CHAIN LINK FENCE TYPE CL-6 (SLATTED)	70*	LF	$_____	$_____
0050	26' CHAIN LINK FENCE DOUBLE SWING GATE (TYPE CL-6, SLATTED)	1	EA	$_____	$_____
0051	15' PIPE GATE	1	EA	$_____	$_____

0052	COMBINATION AIR VACUUM VALVE AT PUMP	2	EA	$_____	$_____
0053	36" GATE VALVE AT PUMP	2	EA	$_____	$_____
0054	36" SWING CHECK VALVE AT PUMP	2	EA	$_____	$_____
0055	24" CLASS 4 REINFORCED CONCRETE PIPE	68	LF	$_____	$_____
0056	SD MANHOLE	1	EA	$_____	$_____
0057	WARNING SIGH ON LEVEE CROWN	3	EA	$_____	$_____
0058	OUTLET STRUCTURE (RIVERSIDE)	1	LUMP SUM	LUMP SUM	$_____
0059	GATE RISER STRUCTURE (LOCATED IN LEVEE- INCLUDES MANHOLE LADDER, LID, ETC.)	1	LUMP SUM	LUMP SUM	$_____
0060	84" X 60 " SLUICE GATE	1	EA	$_____	$_____
0061	84" X 60 " AUTOMATIC DRAINAGE GATE	1	EA	$_____	$_____
0062	36" AUTOMATIC DRAINAGE GATE	2	EA	$_____	$_____
0063	24" AUTOMATIC DRAINAGE GATE	1	EA	$_____	$_____
0064	24" FLARED END SECTION	1	EA	$_____	$_____
0065	ROCK SLOPE PROTECTION (FACING, METHOD B)	120*	TON	$_____	$_____
0066	EROSION CONTROL SEEDING	3.5*	ACRE	$_____	$_____

SUBTOTAL ESTIMATED PRICE (ITEMS 0044 THRU 0066) $_____

OPTION

CONTRACTOR SHALL PROVIDE AND OPERATE "TEMPORARY FLOOD DISCHARGE PUMPING FACILITIES INCLUDING TEMPORARY POWER" WHICH ARE CAPABLE OF PUMPING NOT LESS THAN 40,000 GAL/MIN CAPACITY AGAINST A TOTAL HEAD OF 30 FEET WITH A WATER SURFACE IN THE SUMP AT ELEVATION 30 FEET. TEMPORARY FLOOD DISCHARGE PUMPING SHALL BE IN PLACE AND OPERATIONAL BY 15 NOVEMMBER 2003.

0067	***TEMPORARY FLOOD DISCHARGE PUMPING***	***1***	***LUMP SUM***	***LUMP SUM***	***$_____***

TOTAL ESTIMATED PRICE $_____
(ITEMS 0001 THRU 0067)

* QUANTITY IS AN ESTIMATED AMOUNT. SEE SECTION 00700, FAR 52.211-18, FOR VARIATION IN ESTIMATED QUANTITY CONTRACT CLAUSE.

1. Prices must be submitted on all individual items of this Pricing Schedule. Failure to do so may be cause for rejection of bids.

2. If a modification to a price based on unit price is submitted which provides for a lump sum adjustment to the total estimated price, the applications of the lump sum adjustment to each unit price in the Pricing Schedule must be stated. If it is not stated, the bidder/offeror agrees that the lump sum adjustment shall be applied on a pro rata basis to every unit price in the Pricing Schedule.

3. The bidder/offeror shall distribute his indirect costs (overhead, profit, bond, etc.) over all the items in the Pricing Schedule. The Government will review all submitted Pricing Schedules for any unbalancing of the items. Any submitted Pricing Schedule determined to be unbalanced may be considered nonresponsive and cause the bidder to be ineligible for award.

4. The lump sum, "LS", line items above are not "estimated quantity" line items and therefore are not subject to the Variation in Quantity contract clause.

5. EFARS 52.214-5000 ARITHMETIC DISCREPANCIES (MAR 1995)

(a) For the purpose of initial evaluation of bids/offers, the following will be utilized in resolving arithmetic discrepancies found on the face of the Pricing Schedule as submitted by bidders/offerors:
(1) Obviously misplaced decimal points will be corrected;
(2) Discrepancy between unit price and extended price, the unit price will govern;
(3) Apparent errors in extension of unit prices will be corrected;
(4) Apparent errors in addition of lump-sum and extended prices will be corrected.
(b) For the purpose of bid/offer evaluation, the Government will proceed on the assumption that the bidder/offeror intends the bid/offer to be evaluated on basis of the unit prices, the totals arrived at by resolution of arithmetic discrepancies as provided above and the bid/offer will be so reflected on the abstract of bids/offers.
(c) These correction procedures shall not be used to resolve any ambiguity concerning which bid/offer is low.

6. The successful bidder/offeror grants the options listed in the Pricing Schedule to the Government. This option may be exercised any time up to (60) days after receipt of Notice to Proceed. Exercise of the option occurs upon mailing of written notice to the Contractor. Exercise will be made by the Contracting Officer. The price for exercise of the option includes all work and effort associated with the scope of that item. For determination of lowest bid, see paragraph titled EVALUATION OF OPTIONS in Section 00100 of this solicitation. No additional time for contract completion will be allowed when an option is exercised. The given contract completion time was formulated to include time necessary to perform all option work.

PART 1: GENERAL

1.01 SCOPE OF WORK

A. This division includes the provisions for all material, labor, tools, equipment, testing and services necessary to provide a complete and operable electrical system.

B. The provisions of this section shall apply to all electrical items specified in the various sections of Division 16, Electrical, except where otherwise specified or shown in the Contract Documents. Detailed requirements for specific electrical items are specified in other sections but are subject to the general requirements of this section.

C. The Contractor shall install, ready for use, the electrical system as specified herein and shown on the Contract drawings. Furnish all required labor, materials, project equipment, tools, construction equipment, safety equipment, transportation, test equipment, incidentals and services to provide a complete and operational electrical system as shown on the accompanying drawings, included in these Specifications, or necessary for fully operating facility. See Section 16940 for "Instrumentation Index" for this project.

D. This document describes the function and operation of the system and particular components, but does not necessarily describe all necessary devices. All components and devices shall be furnished and installed as necessary to provide a complete operable and reliable system for accomplishing the functions and meeting the performance set forth hereinafter.

E. Examine the specification and drawings for mechanical equipment and provide all starters, circuit breakers, switches, pushbuttons and appurtenances which are not specified to be with the mechanical equipment. Erect all electrical equipment not definitely stated to be erected by others, furnish and install conduit, wire and cable and make connections required to place all equipment in complete operation.

F. The major components in the scope of work shown on the Contract drawings which includes both the furnishing and installation are:

1. Utility Metering with Main Disconnect.

2. Motor Control Center (MCC):

   a. Motor controls with solid state starters.
   b. Control Panel.
   c. Panelboard and transformer.
   d. Miscellaneous equipment as shown on Contract Drawings.

3. Instrumentation with coordinated mounting supports.

4. Programmable Logic Controller (PLC) and Operator Interface (OI) is used for controlling the pumps and other miscellaneous devices at the Station. The Contractor is to provide all configuration, programming and setup of the PLC and OI.

5. Conduits, grounding system and the field interconnection wiring between the instruments, field devices, and electrical enclosures and mechanical equipment as required for a functional system.

6. All necessary hardware, connectors, fittings, and devices to connect the designated equipment and wiring.

7. All necessary instrument supports, piping and valves to complete installation of any of the instruments listed herein.

8. All necessary miscellaneous shut off, sample and calibration valves to sensors.

9. Trenching, backfilling, compaction and resurfacing for all new underground conduit routes, concrete pads, and pull boxes.

10. Coordination and equipment for new utility power services per Utility engineered drawings.

11. Site electrical devices, lights and receptacles.

G. All electrical equipment and materials, including installation and testing, shall conform to the applicable codes and standards listed in this and other Sections. All electrical work shall conform to the National Electric Code (NEC) ~~1999~~ *2002* issue, Institute of Electrical and Electronic Engineers (IEEE), and Underwriters Laboratories Inc (UL). Nothing on the Drawings or in the Specifications shall be construed to permit methods or materials not conforming to these codes and standards.

1.02 RELATED WORK IN OTHER SECTIONS

A. The following are covered in other sections in the Contract documents and are part of Division 16.

1. Section 16110 – Conduit, Devices, Boxes & Grounding.
2. Section 16120 – Wire, Fuses & Terminal Blocks.
3. Section 16470 – Panelboard and Power Transformer.
4. Section 16480 – Motor Control Center.
5. Section 16482 – Solid State Soft Starter.
6. Section 16600 – Factory and Field Testing.
7. Section 16905 – Control Panel.
8. Section 16910 – PLC & OI Hardware.
9. Section 16915 – PLC & OI Applications Programming.

10. Section 16940 – Instrumentation.

B. Provide an electrical system that interfaces work performed under other Mechanical, Electrical and Equipment Sections of these Specifications.

C. The contents of this section apply to all "electrical and instrumentation" equipment suppliers and manufacturers doing work listed in following sections:

1. Division 11 - Equipment.
2. Division 13 - Special Construction.
3. Division 15 - Mechanical.

1.03 QUALIFICATIONS

A. Electrical Contractor

~~1. It is the intent of this Division that the complete responsibility for management and installation of the electrical and instrumentation required for this project be by the Electrical Contractor. This responsibility includes, but not limited to, supervision and coordination of work performed by all suppliers of Division 16.~~

~~2. General Contractor shall disclose the proposed Electrical Contractor with bid documents that he intends to use on this project.~~

~~3. If the Electrical Contractor, General Contractor or System supplier listed in bid documents are deemed not qualified by Owner Government, they will have their bid rejected at the Owner Government's sole discretion and the next qualified bidder selected.~~

4. The Electrical Contractor shall meet the following minimum qualifications:

a. Has regularly engaged in similar electrical contracting for the Municipal Water and Wastewater Industry.
b. Has successfully performed work of similar or greater complexity on at least two previous projects under the present company name.
c. Has been actively engaged in the type of electrical and instrumentation work specified in this Division for a minimum of two years.
d. Has a current C-10 Electrical Contractor's License.

B. System Supplier/Integrator

~~1. It is the intent of the Owner Government to secure the highest quality of work for this project. The Suppliers listed below have been determined to meet minimum qualifications specified in this Division and are pre-qualified by the Owner Government for providing supplier bids as system suppliers on the project. Other suppliers may submit to Owner~~

~~Government prior to bid opening a statement of qualification listing relevant experience on similar projects completed. The Owner Government will list additional prequalified suppliers in an addendum prior to bid opening.~~

~~a. Tesco Controls, Inc. (916) 395-8800~~
~~b. Krug-Bixby-Long Associates (KBL) (510) 887-1117~~
~~c. Meyer Control Corporation (MCC), (707) 449-0341~~
~~d. Control Manufacturing Company (CMC) (707) 258-8400~~

2. It is the intent of this specification that complete responsibility of the control system required for this project be supplied by a single System Supplier. This responsibility includes, but not limited to, all work necessary to select, furnish, construct, supervise installation, calibrate, test, and place into operation all transmitters, instruments, programmable controllers, motor controls, alarm equipment, communications, monitoring equipment, and accessories as specified herein.

3. The system supplier shall have an on staff a project engineer with prior experience on similar sized projects. This project shall coordinate the technical aspects of this project and prepare the submittals and drawings. The system supplier project engineer shall attend all coordination meetings when specifically requested by the ~~Engineer~~ *Contracting Officer* or ~~Owner~~ *Government*.

~~4. The system supplier shall meet the following minimum qualifications:~~

~~a. Has regularly engaged in similar systems for the Municipal Water and Wastewater Industry.~~
~~b. Has successfully performed work of similar or greater complexity on at least five previous projects under the present company name.~~
~~c. Has been actively engaged in the type of PLCs and instrumentation work specified in this Division for a minimum of five years.~~
~~d. Employs personnel on this project who have successfully completed ISA or equal training courses on general purpose instrumentation.~~
~~e. Has a permanent, fully staffed and equipped service facility within 150 miles of the project site for a minimum of 1 year prior to bid date with personnel and equipment required to maintain, repair and calibrate the instrumentation system.~~

1.04 CONTRACT DOCUMENTS

~~A. The Contract drawings and specifications are intended to be descriptive of the type of electrical system to be provided; any error or omissions of detail in either shall not relieve the Contractor from the obligations thereunder to install in correct in detail any and all materials necessary for a complete operational system, at no additional cost.~~

B. Contract drawings are diagrammatic and indicate general arrangement of systems and equipment, except when specifically dimensioned or detailed. Exact locations of electrical products shall be verified in the field with the ~~Engineer~~ *Contracting Officer*. Field measurements take precedence over dimensioned drawings. Intent is to show size, capacity, approximate location, direction and general relationship of equipment of area shown but not exact detail or arrangement. The requirements or descriptions in the drawings shall take precedence in the event of conflict.

~~C. Location at facilities of equipment, inserts, motors, anchors, panels, pull boxes, manholes, conduits, stub-ups, lighting fixtures, power outlets and fittings for the electrical system are to be determined by the Contractor and Engineer Contracting Officer at time of installation. Contractor shall make minor adjustments to locations of electrical equipment as required by conditions or in coordination with other trades at no additional cost.~~

~~D.~~ The Contractor shall examine the architectural, mechanical, structural, and electrical and instrumentation equipment provided under other specifications sections in order to ~~determine~~ *coordinate* the ~~exact~~ routing and final terminations for all conduits and cables. The exact locations and routing of cables and conduits shall be governed by structural conditions, physical interferences, and the physical location of wire terminations on equipment. Conduits shall be stubbed up as near as possible to equipment electrical terminals. ~~If the Contractor installs equipment conflicting with the architectural, mechanical, structural, instrumentation or electrical equipment provided under this and other specifications sections, the Contractor shall replace without additional cost to the Owner Government.~~

~~E.~~ All equipment shall be installed and located so that it can be readily accessed for operation and maintenance. ~~The Engineer Contracting Officer reserves the right to require minor changes in location of equipment, without incurring any additional costs.~~

F. Where conduits are shown on the Contract drawings, or stated to be furnished but not explicitly shown, as part of the scope of work; the Contractor shall provide all fittings, boxes, wiring, etc. as required for completion of the raceway system in compliance with the NEC and the applicable specifications in this Section.

G. No changes from the Contract drawings or specifications shall be made without written approval of the ~~Engineer~~ *Contracting Officer*. Should there be a need to deviate from the Contract documents, submit written details and reasons for all changes to the ~~Engineer~~ *Contracting Officer* for favorable review.

~~H. The resolution of conflicting interpretation of the Contract documents shall be as determined by the Engineer Contracting Officer.~~

I. The Contractor shall maintain a neatly and accurately marked full size set of Contract Drawings recording the as built locations and layout of all electrical and

instrumentation equipment, routing of raceways, junction and pull boxes, and other diagram or drawing changes. Drawings shall be kept current weekly, with all "change orders", submittal modifications, and construction changes shown. Drawings shall be subject to the inspection by the ~~Engineer~~ *Contracting Officer* at all times, progress payments or portions thereof may be withheld if drawings are not accurate or current.

When documents are changed, they shall be marked with erasable colored pencils using the following coloring scheme:

Additions - red
Deletions - green
Comments - blue
Dimensions - black

Prior to acceptance of the work, the Contractor shall deliver to the ~~Engineer~~ *Contracting Officer* one set of record full size drawings neatly marked accurately showing the information required above.

1.05 COORDINATION

~~A.~~ The Contractor shall coordinate the electrical work with the other trades, ~~code authorities, utilities, and the Engineer Contracting Officer; with due regard to their work, towards promotion of a rapid completion of the project. If any cooperative work must be altered due to lack of proper supervision of such, or failure to make proper provisions, then the Contractor shall bear expense of such changes as necessary to be made in work of others.~~

~~B. Manufacturer's directions and instructions shall be followed in all cases where such is not shown on the Contract Drawings or herein specified.~~

C. Coordinate all work with the serving Power Utility, Pacific Gas & Electric (PG&E) for the work shown on Contract Drawings. The Contractor shall obtain the required inspections.

1. Submit to the power Utility the proposed metering details. Provide a written statement from the Utility that shows approval of proposed metering.

2. All work associated with material and installation for the Utility power service not paid by the Utility shall be borne by the Contractor. The Contractor shall provide and install all material, conduits, wiring, pull ropes, pole risers, transformer pads, bollards, etc. as shown on Utility engineered drawings or standards for new power service.

3. All fees and charges of the Utility power for *permanent* service hook-up will be paid by the ~~Owner~~ *Government*.

D. Coordinate all work with the serving Telephone Utility for the new telephone service.

1. Provide all the equipment and materials not provided by the telephone Utility Company for permanent service at the locations shown on the Contract Drawings. All work shall meet the requirements of the serving telephone Utility Company.

2. Coordinate all work with the serving telephone Utility, obtain the required inspections, and notify the respective Utility Company when service is required.

3. All fees and charges associated with the new telephone service will be paid by the ~~Owner~~ *Government*.

~~E. Following award of Contract, schedule all service installations and connections with utilities. Construction or start-up delays as a consequence to lack of documented effort by the Contractor which delay the project completion due to lack of Utility services will not be considered valid and Contract liquidated damages will be assessed.~~

~~F. The Contractor shall cease work at any particular point and temporarily transfer his operations to other portions of work as directed by the Owner Government, when in the judgment of the Owner Government it is necessary to do so.~~

G. Prior to commencing construction, the Electrical Contractor shall arrange a conference with the ~~Owner~~ *Government* as well as all equipment and system suppliers vital to the current phase of work. During the meeting, the equipment supplier shall verify types, sizes, locations, installation requirements, controls and diagrams of all equipment furnished. The equipment supplier shall inform the ~~Engineer~~ *Contracting Officer* in writing that all phases of coordination of this equipment have been covered. If there are any additional issues or coordination requiring ~~Engineer~~ *Contracting Officer* attention, they shall be identified within the letter at this time. If the supplier does not complete this coordination, then the equipment supplier and Contractor shall assume full responsibility for coordination and costs of equipment installation.

H. Where connections must be made to existing or new operational facilities, the Contractor shall schedule all the required work with ~~Owner~~ *Government*, including the power shutdown period. Carry out each shutdown so as to cause the least disruption to the operation of the installation.

1. The Contractor shall limit all unscheduled shutdown periods to less than 15 minutes and only with prior approval of the Station operator.

2. Carry out shut downs of durations greater than 15 minutes only after the time and date schedule and sequence of work proposed to be accomplished during shutdown has been favorably reviewed by the ~~Owner~~ *Government*. Submit shutdown plans at least 2 days in advance of when the scheduled shutdown is to occur.

3. The ~~Owner~~ *Government* reserves the right to delay, change, or modify any scheduled shutdown at any time, at no additional cost to the ~~Owner~~ *Government*, when the risk of such a shutdown would jeopardize the operation of the water distribution system and/or water plant operation.

~~1.06 SUPERVISION~~

~~A. The Contractor shall schedule all activities, manage all technical aspects of the project, coordinate submittals and drawings, and attend all project meetings associated with this Section.~~

~~B. The Contractor shall supervise all work in this Section, including the electrical system general construction work, from the beginning to completion and final acceptance.~~

~~C. The Contractor shall supervise and coordinate all work in this Section to insure each phase of the project, submittal, delivery, installation, and acceptance testing, etc. is completed within the allowable scheduled time frames.~~

~~D. The Contractor shall be responsible for obtaining, preparing, completing, and furnishing all paper work for this Section; which shall include transmittals, submittals, forms, documents, manuals, instructions, and procedures.~~

1.07 INSPECTIONS

~~A. All work or materials covered by the Contract documents shall be subject to inspection at any and all times by the Owner Government. If any material does not conform to the Contract documents, or does not have a favorably reviewed submittal status; then the Contractor shall, within three days after being notified by the Owner Government, remove said material from the premises; and if said material has been installed, the entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the Contractor.~~

B. The ~~Engineer~~ *Contracting Officer* may inspect and test the fabricated equipment at the factory before shipment to job site. See Section 16600 for requirements.

~~C. Work shall not be closed in or covered over before inspection and approval by the Engineer Contracting Officer. All costs associated with uncovering and making repairs where non-inspected work has been performed shall be borne by the Contractor.~~

D. The Contractor shall cooperate with the ~~Engineer~~ *Contracting Officer* and provide assistance at all times for the inspection of the electrical system under this Contract. The Contractor shall remove covers, provide access, operate equipment, and perform other reasonable work which, in the opinion of the ~~Engineer~~ *Contracting Officer*, will be necessary to determine the quality and adequacy of the work.

1.08 JOB CONDITIONS

A. Construction Power

1. The Contractor shall make all arrangements and pay the costs thereof for temporary services required during construction of the project, such as temporary electrical power and telephone service.

2. When required, provide all equipment, materials and wiring in accordance with the applicable codes and regulations *and EM 385-1-1*.

3. Upon completion of the project, remove all temporary services, equipment, material and wiring from the site ~~as the property of the Contractor~~.

B. Equipment Storage

1. The Contractor shall provide adequate protection for all equipment and materials during shipment, storage and construction.

2. Equipment and materials shall be completely covered with two layers of plastic and set on a pallet above grade so that they are protected from weather, wind, dust, water, or construction operations.

3. Equipment shall not be stored outdoors without the approval of the ~~Engineer~~ *Contracting Officer*. Where equipment is stored or installed in moist areas, such as unheated buildings, etc., provide an acceptable means to prevent moisture damage, such as a uniformly distributed heat source to prevent condensation.

C. The project site is located in Northern California where outside temperatures vary between 10 deg F. to 110 deg F. Humidity in this area will range from 10% to 100%.

1.09 SUBMITTAL AND DRAWING REQUIREMENTS

~~A. The Contractor shall ensure all equipment suppliers provide the submittal documentation required in this section. Submittals shall be complete, neat, orderly, and indexed. The Contractor shall check all submittals required under this Division for the correct number of copies, adequate identification, correctness, and compliance with the Contract Specifications and Drawings, and initial all copies certifying compliance.~~

B. Identify all submittals by submittal number on letter of transmittal. Submittals shall be numbered consecutively and resubmittals shall have a letter suffix. For example:

1. 1st submittal: 1
2. 1st resubmittal: 1A
3. 2nd resubmittal: 1B, etc.

C. Within calendar 45 days after contract award the Contractor shall furnish to the Engineer Contracting Officer six (6) sets of all submittals required for this Division except for training documents and test procedures.

D. Normally, the Engineer Contracting Officer will review and return two (2) copies of the submittals within 14 30 calendar days after receipt, exclusive of any time awaiting clarification or further information.

E. The reviewed submittals will be annotated "Make Corrections Noted", "No Exceptions Noted", "Revise and Resubmit Noted Items", or "Rejected without Review". The following actions shall then be taken by the Contractor:

1. "No Exceptions Noted" - The Contractor may proceed with the work covered in this submittal. No resubmission is necessary.

2. "Make Corrections Noted" - The Contractor may proceed with the work covered in this submittal incorporating the changes noted. However, the Contractor shall revise the submittal in accord with the changes noted and resubmit six (6) copies of drawings, bill of materials, and catalog data denoting changes within 14 calendar days when requested by the Engineer Contracting Officer for record keeping purposes.

3. "Revise and Resubmit Noted Items" - The Contractor shall not proceed with the work covered in this submittal. The Contractor shall revise and correct the submittal in accordance with the comments and resubmit six (6) copies within 14 calendar days for approval.

4. "Rejected without Review" submittal - The Contractor shall not proceed with the work covered in this submittal. The Contractor shall revise and correct the submittal in accordance with the specifications, and resubmit six (6) copies within calendar 14 days 30 Days for approval.

F. Resubmittals shall address all comments by the Engineer Contracting Officer. Partial resubmittals may be returned without review at the discretion of the Engineer Contracting Officer. The Contractor shall be responsible for the Engineer Contracting Officer 's review cost for each resubmittal in excess of the second resubmittal. These costs will be back-charged to the Contractor and will be deducted from his progress payments.

G. The Contractor shall coordinate submittals with the work so that project will not be delayed. This coordination shall include scheduling the different categories of submittals, so that one will not be delayed for lack of coordination with another. Time extensions will be allowed because of failure to properly schedule submittals.

H. No material or equipment shall be delivered to the job site until the submittal for such items has been reviewed by the Engineer Contracting Officer and marked "no exceptions noted" or "make corrections noted".

I. The Contractor shall coordinate submittal with the work so that project will not be delayed. This coordination shall include scheduling the different categories of submittal, so that one will not be delayed for lack of coordination with another.

J. The equipment specifications have been prepared on the basis of the equipment first named in the Specifications. The Contractor shall note that the second named equipment, if given, is considered acceptable and equal equipment, but in some cases additional design, options, or modifications may be required to meet Specifications all at no additional cost to the Owner Government.

K. The decision of the Engineer Contracting Officer governs what is acceptable as a substitution. If the Engineer Contracting Officer considers it necessary, tests to determine equality of the proposed substitution shall be made, at the Contractor's expense, by an unbiased laboratory that is satisfactory to the Engineer Contracting Officer.

L. Each submittal shall be bound in a three ring binder, which is sized such that when all material is inserted the binder is not over 3/4 full. Binder construction shall allow easy removal of any page without complete manual disassembly; spiral ring type binders are not acceptable.

1. Each binder shall be appropriately labeled on the outside spine & front cover with the project name, contract number, equipment supplier's name, specification section(s), and major material contained therein.

2. An index shall be provided at the inside of the front cover. This index shall itemize the contents of each tab and subtab section. Also list the project name, contract number and equipments supplier's name, address, phone number, and contact person on the index page.

3. Field equipment shop documents, panel equipment shop documents, drawings, and bill of materials shall be grouped under separate tabs. Shop documents shall be ordered in the same sequence as their corresponding Contract specification subsection.

4. All spare parts shall be listed separately at the end of the Bill of Materials list.

~~5. Data summary sheets shall be provided to subtab all shop documents for each individual piece of instrumentation. Data summary sheets shall be bright yellow or blue for easy identification.~~

~~The data summary sheets shall have the following information preceding their corresponding shop documents:~~

~~a. Instrumentation type and tag name as used on the Contract Drawings or schedules.~~
~~b. Location/description of assembly at which it is installed.~~
~~c. The manufacturer's model number, part number or other designation. This shall include the specific numbers of all proposed options.~~
~~d. Range, span, engineering units, input and output characteristics.~~
~~e. Description of component as it relates to the model number. For each portion of the model number the associated description shall be shown.~~
~~f. Contract specification subsection number.~~

~~6. Drawings may be bound in separate 11 x 17 binder or included with the 8.5 x 11 binder if folded such that the title block is visible with drawing folded. Drawings that are "C" or "D" size are not allowed.~~

M. The electrical submittals shall include but not be limited to data sheets and drawings for each product together with the technical bulletin or brochure. The electrical submittals shall include (as a minimum):

1. Table of Contents

2. Comment Letter: The Project ~~Engineer~~ *Contracting Officer* of the System Supplier shall note all deviations from Contract Documents and the reason(s) for the deviation. He may use this forum to inform the ~~Engineer~~ *Contracting Officer* or installing Contractor of important information related to the project. RFIs must be submitted separately.

3. Bill of Materials: The Contractor and System supplier each shall provide Bill of Material for electrical components formatted as shown in Section 16600 Appendix "A". Generic names or part numbers as defined by a distributor or Integrator are <u>not</u> acceptable. Only the originating manufacturer's name and part number shall be listed.

4. Shop Drawings:

   a. Plant layout drawing showing accessibility.

   b. Equipment elevations with enclosure details drawn to scale.
   c. Electrical One-line and Elementary diagrams
   d. Computer I/O diagrams.
   e. Interconnection diagrams

5. Catalog Data shall include the following:

a. Instrumentation data summary sheets (by Contractor)
b. Manufacturer's catalog ordering information
c. Manufacturer's description or equipment features
d. Physical size and mounting details
e. Range and/or calibration
f. Input/output signal characteristics
g. Requirements for electric power, air, and/or water supply
h. Options selected and available
i. Materials of construction of components

6. Program Software Documentation

a. Programming hardcopy
b. Programming disk copy

~~N. Deviations from the Contract documents shall not be incorporated into the work without prior written approval of the Engineer Contracting Officer. A "Change Order" directive from the Engineer Contracting Officer is required prior to incorporating any deviation from the Contract documents that has costs associated. The cost differential associated with this change order must be negotiated with the Engineer Contracting Officer to amend the Contract to reflect the costs or savings.~~

~~O. Exceptions to the Specifications or Drawings or equipment or procedures submitted as "equal" to specified equipment shall be clearly identified by the equipment supplier in a letter at the front of the submittal. Submittal data for "equal" equipment or procedures shall contain sufficient details so a proper evaluation may be made by the Engineer Contracting Officer. The Contractor is responsible for verifying proper application/operation of substituted equipment.~~

~~P. All shop and interconnect drawings shall be generated with a computer utilizing the AutoCAD 14 or later drafting package. Standard preprinted drawings simply marked to indicate applicability to the Contract will not be acceptable. Drawings shall be prepared in a professional manner and shall have borders and a title block identifying the project, system, drawing number, AutoCAD file name, project engineer, date, revisions, and type of drawing. Drawings shall be no smaller than 11" x 17" and printed with a laser jet printer or plotted in ink white paper. The lettering shall be legible and no smaller than 0.075 inch in height.~~

~~1. The Contractor shall submit for approval the proposed drawing format for each type of drawing or diagram specified. The Contractor shall not go into production with the drawings or diagrams for this project until the Engineer Contracting Officer has given written approval of the submitted proposed drawing format submittal.~~

~~2. Shop drawings shall be provided with minimum drafting details as illustrated on the Contract electrical drawings. Diagrams shall carry a uniform and coordinated set of wire colors, wire numbers, and terminal block numbers.~~

Q. Shop Drawings - Shop drawings shall be furnished for each electrical panel even if one was not shown explicitly on the Contract drawings. Each shop drawing shall include the following as a minimum:

1. Electrical one line diagrams detailing all devices associated with the power distribution system.

2. Detailed analog and digital I/O diagrams showing the wiring requirements for each instrument or device connection. Reference the Contract Drawings for an example of each I/O card drawing requirements. If one is not included in the Contract Drawings, then one may be obtained from the ~~Engineer~~ *Contracting Officer* upon request.

3. Elementary diagrams shall be provided for all relay logic, power supplies, and other wiring not shown on the loop diagrams. All elementary diagrams shall be drawn in JIC EMP/EGP format and standards. Show rung number, coil and contact cross references on all drawings.

4. Enclosure layout diagrams; show all front panel and backpan devices drawn to scale. Show fabrication methods and details; including material of construction, paint color, support & latching mechanisms, fans & ventilation system, and conduit entrance areas.

5. Submit full size drawing of all nameplates and tags to be used on the project. The ~~Engineer~~ *Contracting Officer* has the right to adjust nameplate engraving titles during submittals at no additional cost to the ~~Owner~~ *Government*. Submittal to include the following:

    a. Dimensions of nameplate.
    b. Exact lettering and font for each nameplate.
    c. Color of nameplate.
    d. Color of lettering.
    e. Materials of construction.
    f. Method and materials for attachment.
    g. Drawing showing location of nameplate on each panel.

PART 2: PRODUCTS

2.01 QUALITY

A. ~~It is the intent of the Contract specifications and drawings to secure the highest quality in all materials and equipment in order to facilitate operation and maintenance of the facility.~~ All equipment and materials shall be new and the products of reputable suppliers having adequate experience in the manufacture of these particular items. For uniformity, only one manufacturer will be accepted for each type of product.

B. All equipment shall be designed for the service intended and shall be of rugged construction, of ample strength for all stresses which may occur during fabrication, transportation, erection, and continuous or intermittent operation. All equipment shall be adequately stayed and braced and anchored and shall be installed in a neat and workmanlike manner. Appearance and safety, as well as utility, shall be given consideration in the design of details. All components and devices installed shall be standard items of industrial grade, unless otherwise noted, and shall be of sturdy and durable construction suitable for long, trouble free service. Light duty, fragile and competitive grade devices of questionable durability shall not be used.

C. Products that are specified by manufacturer, trade name or catalog number established a standard of quality and do not prohibit the use of equal products of other manufacturers ~~provided they are favorably reviewed by the Engineer Contracting Officer prior to installation.~~

~~D. Underwriters Laboratories (UL) listing is required for all substituted equipment when such a listing is available for the first named equipment.~~

E. When required by the Contract Specifications or requested by the ~~Engineer~~ *Contracting Officer*, the Contractor shall submit equipment or material samples for test or evaluation. The samples shall be furnished with information as to their source and prepared in such quantities and sizes as may be required for proper examination and tests, with all freight and charges prepaid. All samples shall be submitted before shipment of the equipment or material to the job site and in ample time to permit the making of proper tests, analyses, examinations, rejections, and resubmissions before incorporated into the work.

2.02 NAMEPLATES & TAGS

A. Equipment exterior nameplates - Nameplate material shall be rigid laminated black plastic with beveled edges and white lettering; except for caution, warning, and danger nameplates the color shall be red with white lettering. The size of the nameplate shall be as shown on the drawings. No letters are allowed smaller than 3/16". All nameplates located outdoors shall be UV resistant. Securely fasten nameplates in place using two stainless steel screws if the nameplate is not an integral part of the device. Epoxy cement or glued on nameplates will not be acceptable. Engrave the nameplates with the inscriptions as approved by the ~~Engineer~~ *Contracting Officer* in the submittal.

1. For each major piece of electrical equipment provide a manufacturer's nameplate showing the Contract specified name and number designation, and pertinent ratings such as voltage, # of phases, ratings, etc.

2. For each device with a specific identity (pushbutton, indicator, instrument, etc.) mounted on the exterior or deadfront of a piece of equipment provide a nameplate with the inscription as shown in the Contract documents.

3. Where no inscription is indicated in the Contract documents, furnish nameplates with an appropriate inscription providing the name and number of device.

B. Equipment Interior Nameplates - Nameplate material shall be clear plastic with black machine printed lettering as produced by a KROY or similar machine; except caution, warning, and danger nameplates shall have red lettering. The size of the nameplate tape shall be no smaller than 1/2" in height with 3/8" lettering unless otherwise approved by the ~~Engineer~~ *Contracting Officer*. Securely fasten nameplates in place on a clean surface using the adhesion of the tape. For each device with a specific identity (relay, module, power supply, fuse, terminal block, etc.) mounted in the interior of a piece of equipment provide a nameplate with the inscription as shown in the Contract documents. Where no inscription is indicated in the Contract documents, furnish nameplates with an appropriate inscription providing the name and number of device used on the submittal drawings. Stamp the nameplates with the inscriptions as approved by the ~~Engineer~~ *Contracting Officer* in the submittal.

C. Equipment Tags - When there is no space or it is impractical to attach an engraved plastic nameplate with screws, as is the case with most field devices and instruments, the Contractor shall attach a tag to the equipment with the same inscriptions as specified above in paragraph A. The tag shall be made from stainless steel material and the size of the nameplate shall be no smaller than 3/8"h x 2"w with 3/16" machine printed or engraved lettering unless otherwise approved by the ~~Engineer~~ *Contracting Officer*. The tag shall be attached to the equipment with stainless steel wire of the type normally used for this purpose.

2.03 COMPONENTS

A. SWITCHES AND PUSHBUTTONS

1. Switches (HS) and pushbuttons (HC) for general purpose applications shall be water and oil tight as defined by NEMA 4X, corrosion resistant as defined by NEMA ICS 6-110.58, U.L. listed, standard 30 mm diameter, with plastic holding nut.

2. Switches and pushbuttons shall have contacts rated NEMA A600 or 10 amperes continuous and 600 VAC. Provide NO and NC contacts as required.

3. Engraved black legend plates shall be provided to define each switch and pushbutton function.

4. Selector switch handles and pushbutton caps shall be black unless otherwise noted on drawing. Lock-out stop caps shall be red.

5. Selector switches for hand-off-auto (HOA) applications shall have the hand position to the left, off in center, and auto in the right position.

6. Pushbuttons and selector switches in hazardous locations shall have hermetically sealed contacts or explosion proof enclosures.

7. Lockout stop pushbuttons shall include padlocking attachment. Pushbutton type shall be coordinated with padlock attachment type.

8. Switches and pushbuttons shall be Allen-Bradley 800H, or approved equal.

B. INDICATING LIGHTS

1. Indicating Lights for general purpose applications shall be NEMA 4X, corrosion resistant as defined by NEMA ICS 6-110.58, U.L. listed, 30 mm diameter, with plastic lens, plastic holding nut, and miniature bayonet lamp base.

2. Lamp shall be full voltage 120 VAC with 28 chip (min) High Intensity LED.

3. Indicating lights shall have contacts rated NEMA A600 or 10 amperes continuous and 600 VAC. Provide NO and NC contacts as required.

4. Engraved black legend plates shall be provided to define each lights function.

5. Indicating light type and color of lens shall be as shown on the Drawings or specified in the Contract documents. Lamp color shall be as follows:

a.	Open/On	Green
b.	Closed/Off	Red
c.	Alarm	Amber
d.	Power On	White

6. Indicating lights designated "PTT" on wiring diagram or shown with push-to-test wiring shall be provided with a push-to-test switch and wiring.

7. Indication lights shall be Allen-Bradley 800H, or approved equal.

C. RELAYS AND TIMERS

1. General: Relays and timers shall be provided with N.O. or N.C. contacts as shown on the Contract drawings. All spare contacts shown shall be provided. Contacts shall be rated 10 amps minimum at 120 VAC, 60 Hz unless otherwise shown on the Contract drawings. Coil voltage shall be 120 VAC unless otherwise described or shown on the Contract drawings. Relays and timers shall be designed for continuous duty. All relays shall be U.L. listed. All relays and sockets shall be the product of a single manufacturer. The following is a summary of abbreviations associated with relays and timers:

   CR – Control relay
   TR – Timing relay
   TDOE – Time delay on energization
   TDOD – Time delay on de-energization

2. Sockets for plug-in relays and timers shall be standard industrial type din rail mount with barrier type pressure plate screw terminals. Sockets shall be rated 300 VAC, 10 amps minimum.

   a. Blade 8 or 11 pin for coil voltage above 90 volts AC or DC.
   b. Octal 8 or 11 pin for coil voltage below 90 volts AC or DC.

3. Control relays (CR) shall be plug-in type with neon indicating lights and clear see-through sealed housing to exclude dust. Provide IDEC Type RR, or approved equal. Two form-C contacts (minimum) shall be provided on each relay.

4. Time delay relays on energization (TR-TDOE) shall be solid state plug-in relays with adjustable timer ranges from 1 second to 10 hours selectable unless other ranges are shown. Provide LED timer energized indicator lamp. Time delay relays shall be IDEC RTE, or approved equal.

5. Time Delay Relays (TR-TDOD)

   a. Time delay relays on de-energization (TR-TDOD) (continuous power control input) shall be solid state plug-in relays with a timer adjustable range from 1 second to 10 hours selectable unless other ranges are shown. Provide LED timer energized indicator lamp. Time delay relays shall be IDEC RTE, or approved equal.

   b. Time delay relays on de-energization (TR-TDOD) (true off) shall be solid state plug-in relays with a timer adjustable range from 1 second to 10 minutes unless other ranges are shown. True off time delay relays shall be IDEC GT3F-2, or approved equal.

E. CIRCUIT BREAKERS

1. Circuit breakers shall be of the indicating type, providing ON, OFF and TRIPPED positions of the operating handle. Circuit breakers shall be quick-make, quick-break, with a thermal-magnetic (TM) action, except when protecting motor feeders where motor circuit protector (MCP) breakers with adjustable magnetic trip shall be used. Circuit breakers shall be the bolt-on type. The use of tandem or dual circuit breakers in a normal single-pole space to provide the number of poles or spaces specified are not acceptable. All multiple-pole circuit breakers shall be designed so that an overload on one pole automatically causes all poles to open. Circuit breakers and motor circuit protectors shall be manufactured by Cutler-Hammer, G.E., ITE, or approved equal.

2. Each 480 volt circuit breaker shall have a minimum interrupting capacity of 42,000 amperes. Each 120 or 208 or 240 volt breaker shall be rated for a minimum 10,000 amperes interrupting capacity. Breakers shall be sized as shown on Drawings and as necessary for the supplied equipment.

F. CONTROL POWER TRANSFORMER

1. Control power transformer shall be epoxy encapsulated for superior dust and moisture protection. The internal wiring shall be copper and have 105 deg. C insulation rating. The unit shall feature barriered screw terminals for connection to electrical circuits. Provide with time-delay, slow-blow secondary fuse rated to protect the transformer and interrupt 10,000 amperes at 120VAC. Two primary fuses rated to interrupt ~~42,000~~ *65,000* amperes at 480 VAC shall be provided. Transformer minimum size and voltage ratings shall be as shown on Contract drawings. Control power transformer shall be Micron Impervitran or approved equal.

G. VOLTAGE MONITOR/RELAY (PFR)

1. The voltage monitor relay (PFR) shall continuously monitor the three phases for power loss, low voltage, phase loss, and phase reversal. The time/date function shall time stamp failures in the electrical system. The voltage monitor shall have a drop-out voltage adjustment and fault delay adjustment from 0.1 to 15 seconds and delay on make/break adjustment from 0.1 to 10 minutes. The unit shall have a status/fault indicating 2 line LCD alphanumeric text display. Voltage monitor/relay shall be 3 phase multiple function Watsco 8002 series Linebacker Phase Protector, or approved equal.

H. SURGE SUPPRESSOR

1. The surge suppressor shall be rated for use on a 480 VAC, 3 phase WYE system. The nominal line voltage of the surge suppressor shall be 277V L-N with a maximum continuous line voltage of 320V L-N. The surge suppressor shall dissipate a minimum of 80,000 amps single pulse surge current over a 8x20 usec period. The surge suppressor shall dissipate a minimum of 2560 joules transient energy per

phase. Provide external fusing as required by the manufacturer for proper operation. The surge suppressor shall be Leviton 32277-DY3, or approved equal.

2.04 DEVICES

A. SWITCHES

1. General purpose specification grade switches shall be manufactured in accordance with UL 20. Switches shall be one pole rated, 20 amps, at 277 VAC, 1HP at 120 VAC, 2 HP at 240 VAC. Switches shall have copper alloy contact arm with silver cadmium oxide contacts. Switches shall have slotted terminal screws and a separate green grounding screw. Provide Leviton 1221, or approved equal.

2. Special purpose switches shall be provided with the amperage, voltage, and configuration as shown on the Drawings. Switches used as motor disconnects for single phase motors shall be horsepower rated.

B. RECEPTACLES

1. General purpose receptacles shall be duplex and rated 20 amps, 120 VAC, 2 pole, 3 wire grounding, NEMA 5-20R configuration, specification grade, and side wired to screw terminals. Face color shall be ivory. General purpose receptacles shall be specification grade Leviton 5362-I or approved equal.

2. GFI (ground fault circuit interrupting) receptacles shall be used in all boxes shown as weatherproof. GFI receptacles shall be duplex, 20A, 120V, with "test" and "reset" buttons with shallow design for mounting and standard screw terminals for direct wiring. “Daisy Chain” connecting multiple receptacles from one GFI unit is not acceptable. GFI receptacles shall be Leviton 6898, or approved equal.

2.05 UTILITY METERING SWITCHBOARD

A. Metering Panel

1. Provide front accessible, self contained meter/main power utility metering panel. Voltage, phase, AIC and continuous amperage rating shall be as shown on Contract Drawings. Panel will include meter socket, factory installed breaker(s) and test by-pass facility.

2. Design entrance features per NEC, local codes, and serving Utility requirements.

3. Metering enclosure shall be NEMA 3R construction for underground utility service. Enclosure shall be manufactured from galvanized 14 ga. (min) sheet steel. The cabinet shall be finished with ANSI 61 gray enamel paint. Provide pad mount, surface mount or flush mount cabinet per installation detail.

4. Utility metering switchboard shall be Cutler Hammer Pow-R-Line, Tesco Metering Switchboard or approved equal.

B. Switchboard

1. Switchboard shall be front accessible with group mounted, buss connected circuit protective devices. Where provisions for future circuit protective devices are required, space for the device, corresponding vertical buss, device connectors and the necessary mounting hardware shall be supplied.

2. Distribution section shall meet all requirements per NEC, local codes, and as defined in the drawings.

3. Power buss shall be copper, 3 phase, 4 wire, 480 volt, ~~42,000 AIC~~ *65,000 AIC* minimum (or as shown otherwise in the drawings).

4. Ground buss shall be copper and rated per NEC relative to the power bus amperage rating.

5. Switchboard enclosure shall be NEMA rated as shown in the drawings.

6. Utility metering switchboard shall be Cutler Hammer Pow-R-Line, or approved equal.

2.06 RADIO SYSTEM

A. RADIO MODEM

1. Unlicenced 900 Mhz spread spectrum radio for continuous communications to multiple addresses. The radio system shall be addressable to minimize interference from adjacent systems with different system addresses. The radio shall utilize a DB-9 RS-232 port for communications input and SMA connector for antenna lead connection output. The radio shall operate on DC voltage as shown in contract drawings. The radio shall operate to full performance over a temperature range of -30 deg C to +60 deg C. The radio shall be Data Linc SRM-6000 with diagnostics, or approved equal.

B. ANTENNA

1. Each antenna system shall be furnished and installed complete and functional for the intended use. An antenna system shall include but not be limited to, antenna, antenna pole, mounting hardware, lightning arrestor, and coaxial cables with connectors.

2. Antenna system shall be meet the following specifications:

a. Antenna shall be installed and supported as shown on the Contract Drawings. Support members shall have sufficient strength to withstand

local wind conditions and shall be protected from sun exposure and weather damage.

b. Support hardware such as clamps, orientation mounts, and offset brackets shall be steel protected with a hot dip galvanized finish or stainless steel. Clamps and mounts shall be heavy duty in order to transfer the full antenna load to the support tower or mast. Bolts and screws shall be stainless steel.

c. The radio antenna shall be 9 dB gain, welded construction, vertically polarized, directional type Yagi, VSWR 1.5:1, 50 ohm impedance, N-female connection, Maxrad Model BMOY 8905 or approved equal.

C. TRANSMISSION CABLE

1. Provide 50 Ohm, ½" weatherproof coaxial cable from lighting arrestor to antenna. The coax cable shall have a corrugated outer conductor of copper, copper-clad aluminum inner conductor with foam dielectric. The coax cable shall be jacketed for corrosive environment and ultra-violet exposure. The coax cable shall be capable of a minimum bending radius of 5 inches. The cable shall be installed as one continuous length from the antenna to the lighting arrestor. Antenna cable shall be Andrew LDF4-50A 1/2" coax cable or approved equal.

2. Pigtail connector. Provide low loss connection cable for connecting the Radio antenna connection to the lightning arrestor.

3. A flange mount antenna lighting "N" connector arrestor shall be furnished on the antenna coaxial transmission line. The lighting arrestor shall be grounded using to the radio enclosure itself and directly to the ground buss by a #8 AWG or larger bonding wire. The lightning arrestor shall be a PolyPhaser IS-50NX-C2 or equal with flange mount.

4. Provide miscellaneous hardware such as grounding kits, hanger kits, and feed through assemblies.

5. The cable shall be carefully installed to prevent damage to the jacket and routed with a minimum bending radius of 8 inches.

6. Provide connector weatherproofing kits for outdoor exposed connectors and grounding strap attachments. All mating connectors that are exposed to weather shall be wrapped with a sealing material designed to protect against water and dirt entry into the connectors.

PART 3: EXECUTION

3.01 WORKMANSHIP

A. All work in this Section shall conform to the codes and standards outlined herein.

B. The Contractor shall employ personnel that are skilled and experienced in the installation and connection of all elements, equipment, devices, instruments, accessories, and assemblies. All installation labor shall be performed by qualified personnel who have had experience on similar projects. Provide first class workmanship for all installations.

C. Ensure that all equipment and materials fit properly in their installations.

D. Perform any required work to correct improper installations at no additional expense to the ~~Owner~~ *Government*.

E. The ~~Engineer~~ *Contracting Officer* reserves the right to halt any work that is found to be substandard or being installed by unqualified personnel.

F. Keep the premises free from accumulation of waste material or rubbish on a daily basis. Upon completion of work, remove materials, scraps, and debris from the premises and from the interior and exterior of all devices and equipment. Refinish damaged surfaces to new condition using skilled craftsmen of the trades involved at no additional cost to the ~~Owner~~ *Government*.

G. All equipment installed by the Contractor shall be in accordance with the Drawings and the manufacturer's recommendations & instructions and shall operate to the ~~Engineer~~ *Contracting Officer* 's satisfaction. Follow all manufacturers' instructions for handling, receiving, installation, and pre-check requirements prior to energization. After energization, follow manufacturer's instructions for programming, set-up and calibration of equipment. The Contractor shall be responsible for, and shall correct by repair or replacement, at his own expense, equipment that, in the opinion of the ~~Engineer~~ *Contracting Officer* has been caused by faulty mechanical or electrical assembly by the Contractor. Necessary tests to demonstrate that the electrical and mechanical operation of the equipment is satisfactory and meets the requirements of these Specifications shall be made by the Contractor at no additional cost to the ~~Owner~~ *Government*.

3.02 CONSTRUCTION METHODS, GENERAL

A. All field wires and panel wires shall be per specification Section 16120 - Wire, Fuses & Terminal Blocks.

B. Equipment shall be wired and piped by the manufacturer or supplier. Major field modifications or changes are not allowed without the written "change order"

authority by the Engineer. When field changes are made, the components, materials, wiring, labeling, and construction methods shall be identical to that of the original supplied equipment. Contractor's cost to replace or rework the equipment to match original manufacturer or supplier methods shall be done at no additional cost to the ~~Owner~~ *Government*.

C. Mating fittings, bulkhead fittings, plugs, connectors, etc. required to field interface to the equipment and panels shall be provided by the supplier when the equipment is delivered.

D. All electrical and instrumentation drawings associated with the equipment shall be provided with the equipment when it is delivered to the job site. Drawings for each piece of equipment shall be placed in clear plastic packets of sufficient strength that will not tear or stretch from drawing removal and insertion.

3.03 EQUIPMENT FABRICATION, GENERAL

A. Panel cutouts for devices (i.e. indicating lights, switches) shall be cut, punched, or drilled and smoothly finished with rounded edges. Exposed metal from cutouts that are made after the final paint finish has been applied shall be touched up with a matching paint prior to installing device.

B. All doors shall be fully gasketed with nonshrinkable, water and flame resistant material.

C. Bolts and screws for mounting devices on doors shall be as specified by the manufacturer; otherwise they shall have a flush head which blends into the device or door surface. No bolt or screw holding nuts shall be used on the external surface of the door.

D. No fastening devices shall project through the outer surfaces of equipment.

E. Each component within the equipment shall be securely mounted on an interior subpanel or backpan and arranged for easy servicing, such that all adjustments and component removal can be accomplished without removing or disturbing other components. Mounting bolts and screws shall be front located for easy access and removal without special tools. Access behind the sub panel or backpan shall not be required for removing any component.

F. A ground bus shall be provided in each enclosure or cabinet. It shall have provisions for connecting a minimum of ten grounding conductors. Screw type lugs shall be provided for connection of grounding conductors. All grounding conductors shall be sized as shown on plans or in accordance with NEC Table 250-95, whichever is larger.

G. Minimum wire bending space at terminals and minimum width of wiring gutters shall comply with NEC tables 373-6 (a) & (b).

H. Future device and component mounting space shall be provided on the door, backpan, and subpanel where detailed on the Drawings. Where no detail is shown, provide a minimum of 15 percent usable future space.

I. Doors shall swing freely and close with proper alignment.

3.04 EQUIPMENT SHIPMENT AND STORAGE

A. Shipment -- Any equipment whose destination (jobsite) is more than 25 miles from the factory shall be carefully protected for shipping. All openings shall be protected by plywood securely fastened to the framework of the equipment. Equipment shall be adequately covered during local delivery.

B. Storage -- From the time of receipt until the equipment is installed and energized, the equipment shall be considered in storage. While in storage, a 120V, 1 phase source of power shall be made available and connected to space heaters in all items of equipment so equipped. Equipment not provided with space heaters shall be provided with a light bulb or electric heater while in storage to prevent moisture condensation. Unless stored indoors, it shall be a least 1 foot above grade covered with at least 2 layers of heavy polyethylene plastic sheets and anchored to prevent damage by high winds. All equipment shall be protected from dust and moisture prior to and during construction. .

3.05 DAMAGED PRODUCTS

A. Damaged products will not be accepted. All damaged products that cannot be repaired to the satisfaction of the ~~Owner~~ *Government* shall be replaced with new products at no additional cost to the ~~Owner~~ *Government*.

B. Minor cosmetic damage shall be repaired by spray painting, after properly preparing the surface, all scratches or defects in the finish of the equipment. Only identical paint furnished by the equipment manufacturer shall be used for such purposes.

3.06 FASTENERS

A. Fasteners for securing equipment to walls, floors, and the like shall be stainless steel. The minimum size fastener shall be 3/8 inch diameter.

B. Concrete pad with stainless steel anchor bolts shall be provided for the MCC.

3.07 INSTALLATION, GENERAL

A. Install all products per manufacturer's recommendations and the Drawings.

1. Provide all necessary hardware, conduit, wiring, fittings, and devices to connect the electrical equipment provided under other Sections. The following shall be done by the Contractor at no additional cost to the ~~Owner~~ *Government*:

2. Provide additional devices, wiring, conduits, relays, signal converters, isolators to complete interfaces of the electrical and instrumentation system.

3. Changing normally open contacts to normally closed contacts or visa versa

4. Adding additional relays to provide more contacts as necessary.

5. All programmable devices shall be programmed, set-up and tested by the Contractor prior to startup. Programming and set-up parameters shall be adjusted or changed as directed by the ~~Owner~~ *Government* or ~~Engineer~~ *Contracting Officer* during start-up and throughout the warranty period, at no additional cost to the ~~Owner~~ *Government*.

6. Coordinate with the ~~Owner~~ *Government* and setup all alarm, process, and operation setpoints.

7. Keep a copy of the manufacturer's installation instructions on the jobsite available for review at all times prior to and during the installation of the associated equipment.

B. Panels and enclosures:

1. Install panels and enclosures at the location shown on the Plans or approved by the ~~Engineer~~ *Contracting Officer*.

2. Install level and plumb.

3. Seal all enclosure openings to prevent entrance of insects and rodents.

4. Clearance about electrical equipment shall meet the minimum requirements of ~~1999~~ *2002* NEC 110.26

C. Conduits and Ducts:

1. Install all conduits and ducts per 16110 - Conduit, Devices, Boxes & Grounding System.

D. Wiring, Grounding, and Shielding:

1. Observe proper grounding and shielding practices as this application environment generally noisy. The shield of shielded cables shall be terminated to ground at one end only, the origination end. The shield at the other end shall be encased in an insulated material to isolate it from ground.

E. Cutting and Patching:

1. The Contractor shall do all cutting and patching required installing his work. Any cutting which may impair the structure shall require prior approval by

the ~~Engineer~~ *Contracting Officer*. Cutting and patching shall be done only by skilled labor of the respective trades. All surfaces shall be restored to their original condition after cutting and patching.

F. Cleaning and Touch up:

1. At the completion of the work, all parts of the installation, including all equipment, exposed conduit, and fittings, shall be thoroughly cleaned of grease and metal cuttings. Any discoloration or other damage to parts of the building, the finish, or the furnishings, due to the Contractor's failure to properly clean the system, shall be repaired by the Contractor without cost to the ~~Owner~~ *Government*.

2. The Contractor shall thoroughly clean any of his exposed work requiring same.

3. Vacuum and clean the inside of all electrical and instrumentation enclosures prior to applying power.

4. The Contractor shall paint scratched or blemished surfaces with the necessary coats of quick drying paint to match existing color, texture and thickness. This shall include all prime painted electrical equipment including but not limited to enclosures, poles, boxes, devices etc.

3.08 OPERATING AND MAINTENANCE INSTRUCTIONS

A. At time of completion, the Contractor shall provide a period of not less than 6 hours training for instruction of operation and maintenance personnel in the use of systems. Instruct all personnel at one time in one session. Make necessary arrangements with manufacturer's representative. Provide product literature and application guides for user's reference during instruction.

B. Provide six (6) Operation and maintenance manuals bound in a three ring binder and shall provide at least the following as a minimum.

1. A comprehensive index.

2. A complete "Record" set of favorably reviewed electrical submittals as provided under subsection SUBMITTAL AND DRAWING REQUIREMENTS illustrating all components, piping, and electrical connections.

3. A complete list of the equipment supplied, including serial numbers, ranges, catalog cuts, and pertinent data.

4. Full specifications on each item.

5. Detailed service, maintenance and operation instructions for each item supplied. Schematic diagrams of all electronic devices shall be included. A complete parts list with stock numbers shall be provided for the components that make up the assembly. All of these shall be originals, no copies.

6. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.

7. Complete listing of as-built OI and PLC setup and programming listings.

C. At the end of the project these manuals and drawings shall be updated to show "as-built" conditions.

D. Provide two (2) sets of compact disk (CD) containing all drawings prepared for this project in AutoCAD format, updated to reflect as-built conditions.

3.09 SPARE PARTS

A. The Contractor shall supply all spare parts prior to start of field tests. All parts shall be sealed in plastic bags and delivered to the site in a heavy duty plastic storage bag. Bag shall be clearly labeled with part name & number and the corresponding equipment tagname.

B. The Contractor shall make available any replacement parts that are not manufacturer's normal stock items for immediate service and repair of all the instrumentation equipment throughout the warranty period.

C. The following spare parts shall be provided to the ~~Owner~~ *Government* as part of this Contract:

1. Ten (10) fuses for each type of fuse.
2. Ten (10) lamps for each type of light.
3. Two (2) relays for each type of control, and time delay relay.
4. One (1) power fail relay.

3.10 WARRANTY

A. The Contractor shall have a staff of experienced personnel available to provide service on 2 working days notice during the warranty period. Such personnel shall be capable of fully testing and diagnosing the hardware & software and implementing corrective measures. If the Contractor "fails to respond" in 2 working days, the ~~Owner~~ *Government* at its option will proceed to have the warranty work completed by other resources; the total cost for these other resources shall be reimbursed in full by the Contractor. "Fail to respond" shall be defined as: The Contractor has not shown a good faith effort and has not expended adequate resources to correct the problem. The use of other resources, as stated above, shall not change or relieve the Contractor from fulfilling the remainder of the warranty requirements.

B. The Contractor shall warrant all electrical and instrumentation equipment & software for a period of one (1) year from date of final acceptance. Standard published warranties of equipment which exceed the preceding specified length of time shall be honored by the manufacturer or supplier.

C. Prior to "final acceptance", the Contractor shall furnish to the ~~Engineer~~ *Contracting Officer* a listing of warranty information for all manufacturers of materials and equipment used on the project. The listing shall include the following:

1. Manufacturer's name, Material and equipment description, equipment number, part number, serial number, and model number.

2. Manufacturers service contact person, phone number, and address.

3. Warranty expiration date.

D. Software support which shall be provided by the supplier:

1. Free technical PLC / OI software and hardware configuration phone support for a period of one year. PLC / OI phone support shall be provided directly from the person(s) that configured the PLC / OI. Phone support shall be available between 8 a.m. and 4 p.m. Pacific Standard Time Monday through Friday.

2. The supplier shall correct any PLC / OI software configuration error that is discovered within the warranty period, at no additional cost to ~~Owner~~ *Government*. Updated documentation for each "operation and maintenance" manual and new floppy disks of updated software shall be provided for each correction.

E. The Contractor shall provide all labor and material to troubleshoot, replace, or repair any hardware or software that fails or operates unpredictable during the warranty period, at no additional cost to the ~~Owner~~ *Government*.

F. Each time the Supplier's repair person responds to a system malfunction during the warranty period, he or she must contact the designated ~~Owner~~ *Government* maintenance supervisor for scheduling of the work, access to the jobsite, and permission to make repairs. Operation of facilities necessary to test equipment shall only be performed by or under the direction of the ~~Owner~~ *Government* Staff. The ~~Owner~~ *Government* reserves the right at its sole discretion to deny operations requested by the Supplier.

G. The Contractor shall provide to the ~~Owner~~ *Government* the names, addresses and phone numbers of service personnel.

3.11 FINAL ACCEPTANCE

A. Final acceptance will be given by the ~~Engineer~~ *Contracting Officer* after the equipment has passed the "final acceptance trial period", each deficiency has been corrected, final documentation has been provided, and all the requirements of design documents have been fulfilled.

B. At the end of the project, following the completion of the field tests, and prior to final acceptance, the Supplier shall provide the following to the ~~Owner~~ *Government*:

1. Each "operation and maintenance" manual shall be modified or supplemented by the Supplier to reflect all field changes and as-built conditions.

2. Two (2) disk copies of all final documentation to reflect as-built conditions.

C. Keys: Submit two sets of all keys for locks supplied on this project. Wire all keys for each lock securely together. Tag and plainly mark with lock number or equipment identification, and indicate physical location, such as panel or switch number.

END OF SECTION